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A. D. MELVIN, CHIEF OF BUREAU.

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THE SCORE-CARD SYSTEM OF  
DAIRY INSPECTION.

BY

GEORGE M. WHITAKER.

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[Revised, January, 1914.]



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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF ANIMAL INDUSTRY,  
*Washington, D. C., April 19, 1912.*

SIR: I have the honor to transmit herewith, and to recommend for publication as a circular of this bureau, a manuscript entitled "The Score-Card System of Dairy Inspection," by Mr. George M. Whitaker, who at the time of writing the paper was in charge of market milk investigations in the Dairy Division.

This paper is a revision of Circular 139, which was prepared jointly by Mr. Clarence B. Lane and Mr. Whitaker and published under the same title in 1909. The revision has been made necessary by the growth and development of dairy inspection and the continued demand for information on the subject.

Respectfully,

A. D. MELVIN,  
*Chief of Bureau.*

Hon. JAMES WILSON,  
*Secretary of Agriculture.*

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## THE SCORE-CARD SYSTEM OF DAIRY INSPECTION.

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### OLD-TIME INSPECTION, BASED ON CHEMICAL COMPOSITION OF MILK.

Milk inspection originally dealt with only the chemical composition of milk, and the earliest laws relate to adulteration and skimming. Laws against adulterating milk were enacted in 1856 in Massachusetts. Milk below a specified minimum of milk solids (or food material) was also early placed under a ban by being classed in the same category with adulterated milk, and laws establishing such a minimum, usually called a "standard," exist in almost every State and in many foreign cities. Massachusetts subsequently made the selling of "adulterated milk" and "under-standard milk" separate offenses with different penalties, though in most States adulterated milk and under-standard milk are the same in the eyes of the law. In nearly all States especial provision was early made for allowing the sale of skim milk if properly labeled, although in New York City the sale of skim milk was forbidden until recently.

For many years and until within a comparatively recent time milk inspection was almost exclusively a matter of detecting adulteration, either actual or constructive, watering milk being the most common form of actual adulteration. This phase of inspection is still in existence and is as important as ever and will continue so, for eternal vigilance is necessary in such problems. But in many places the inspection is so efficient and so well established and the danger of detection so great that the number of violations of law against adulterating milk grows relatively less. The same is true of under-standard milk, but there is a growing tendency to reduce the statutory minimum of milk solids required.

Inspectors take samples from milk dealers, and the samples are tested for composition. If there is enough evidence of adulteration or of skimming (unless the milk is labeled "skim milk"), or if the milk is enough below the legal standard to make it probable that such facts will be apparent to a court or jury beyond a reasonable doubt, legal proceedings are usually commenced. In some places a

man is warned on a first offense and is not prosecuted unless it is for a second offense after a warning.

#### MODERN SANITARY INSPECTION, BASED ON BACTERIOLOGY.

The science of bacteriology has given birth to modern sanitary science and has disclosed dangers lurking in the milk supply. This science has shown that dirty milk may be dangerous milk; that associated with dirt are organisms which may cause digestive disturbances, and these may be fatal where digestion is weak, as in the case of infants and invalids. These bacteria may increase rapidly when the milk is not properly cooled, and may be present in objectionable numbers in old milk. It is now an established fact that bovine tuberculosis may be transmitted to human beings, children especially, by the milk supply, and that certain contagious fevers and other diseases may be spread by means of milk. The risk incurred from milk has doubtless been frequently overestimated, but that is no argument against taking due precautions. The slight risk to any one individual among theatergoers or school children is no argument against fire escapes or requiring doors to swing outward.

As a result of this comparatively new knowledge concerning milk and its dangers, the work of milk inspection has broadened wonderfully in recent years and includes more than the detection of adulteration, though many people in their ordinary use of language do not recognize this and continue to speak of "pure milk" as milk that is not watered or contains no preservative. The expression may refer to bacteriological conditions as well as to chemical composition. Dirty milk, though high in milk solids, is not good milk. In a few instances even city officials are not informed as to the newer inspection and therefore confuse the two. Occasionally an inquiry as to local inspection of dairies brings the reply: "Samples are taken regularly and sent to a chemist for analysis." Sometimes, in response to an inquiry as to the quality of the local milk supply comes the answer that "analyses show great improvement."

In the older portions of the country, as stated above, there came first inspection along chemical lines and then for sanitary or bacterial condition. In some of the newer States and cities both forms of inspection have been introduced at the same time. There are cities now of considerable size which were not in existence at the beginning of the movement against adulterated milk.

#### INSPECTION IN THE CITY.

The inspection which deals with bacteria concerned itself first with city conditions. Temperature and bacterial standards have been

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adopted in many places, with regulations as to the location and management of city milk plants and the supervision of methods practiced by the city middlemen. The city milk depot in a horse stable is almost a thing of the past. The modern inspection in the city includes taking samples and making examinations for temperature, dirt, and bacteria.

*Collecting samples.*—Samples should be taken in sterile bottles and transferred to the laboratory as soon as possible; they should be kept cold to prevent bacteria from multiplying in transit, so that the examination may show the bacterial condition of the milk as sold. The collector of samples should be provided with a case which will hold ice.

*Temperature.*—Many cities are now requiring that the temperature of all milk delivered within their limits must be below a certain maximum (50° F. in some places, 60° F. in others). An accurate thermometer is all that is necessary to enable the inspector to determine whether the milk is satisfactory as regards this important requirement. Some cities authorize the inspector to destroy all milk above the specified temperature.

*Examination for dirt.*—This is now an important part of the work of milk inspection, and dairymen are frequently fined as heavily for dirty milk as for adulterated milk or milk below the legal standard in milk solids. The dirt in milk can be detected by examining the bottom of the bottle after the sample has stood a short time. It is also determined quantitatively by means of the centrifuge, which is now a part of the equipment of the modern city laboratory, and by a device perfected by Prof. Farrington and described in Bulletin 195 of the Wisconsin Agricultural Experiment Station, page 9.

*Tests for bacteria, etc.*—The principal value of the bacterial count in milk is as an indicator. If the number of bacteria is high this indicates that the milk has not been produced and handled under sanitary or clean conditions, that it has not been properly cooled at the farm and in transit, or that it is too old. The bacterial count, then, is valuable in the work of milk inspection and gives the health officer some tangible clue to the dairyman who is careless and negligent. The bacterial standards of cities vary from 50,000 to 1,000,000 per cubic centimeter as the maximum limit. A few cities place a limit for the number of pus cells and carefully examine the cows in dairies where the number of cells has been found to be large, requiring the dairyman to discontinue the commercial use of milk from unhealthy animals. No attempt will be made in this publication to describe the proper procedure in examining milk for bacteria, as standard methods have frequently been published. (See Farmers'



Bulletin 490, United States Department of Agriculture, "Bacteria in Milk.") The curd test, which originated in cheese-factory work, will be found useful where a bacteriologist is not at hand.

The inspection of city milk plants is referred to again on page 25 in another connection.

#### INSPECTION IN THE COUNTRY.

State and city boards of health are agreed that inspection of milk in the city, including inspection of methods of distribution, is not enough and that the work should reach out into the country and include the source of the supply and the method of production. Dairy farms should be systematically inspected. There should also be some standard which every dairyman should live up to if allowed to sell milk. What system of inspection will be most helpful and accomplish the best results with the least amount of friction?

The objects of inspection may be stated as follows: To determine in a systematic way the exact conditions in the dairies and record the same in convenient form for reference in order (a) to educate the producer to better methods, and (b) to protect the public from impure milk.

The score-card system of dairy inspection has so far met the requirements better than anything else.

#### THE DAIRY SCORE CARD.

##### HISTORICAL.

The score card for inspection of dairies originated, so far as we can determine, with Dr. William C. Woodward, health officer of the District of Columbia, in January, 1904. Subsequently Prof. R. A. Pearson, of the New York State College of Agriculture, devised a score card differing in details, which he submitted at a field meeting in Syracuse, N. Y., February 25, 1905. In July, 1906, Prof. C. B. Lane, then Assistant Chief of the Dairy Division of the Bureau of Animal Industry, United States Department of Agriculture, devised a third score card which was at once put into active use. It was submitted to health officers of different cities and tried out in many places. Since then a prominent feature of the work of the market milk section of the Dairy Division has been visiting different places on invitation of health officers to give assistance in regard to ordinances and in improving the milk supply, and to explain the score card and its uses. During the past four years the Dairy Division card has been several times changed in minor details as increasing experience has pointed out ways of improvement.

The Official Dairy Instructors' Association early recognized the importance of this system of inspection and also the desirability of a

standard national score card which should be uniform throughout the country, and Messrs. C. B. Lane, R. A. Pearson, and John M. Trueman were appointed a committee on this subject. On July 22, 1908, the committee reported a card which was similar to that then in use by the Dairy Division. The association accepted the report and the Dairy Division adopted the changes. Hence the dairy score card now generally in use has this double indorsement.

#### PRESENT USE.

The score card has rapidly grown in favor and its use has become quite general. It has been officially adopted by State officers in many of the States, and is used in the majority of the agricultural colleges as a means of educating the students in dairy sanitation. Many large milk dealers use the score card for rating the dairies from which they purchase milk. It is also used in several normal schools and teachers' summer schools. One hundred and sixty-nine cities, with an aggregate population of 22,122,399, now use the score card in their routine work of dairy inspection. More or less assistance has been given by the Dairy Division to 109 other cities and towns in 32 States, where the system has not yet been adopted.

#### WHAT IS THE SCORE-CARD SYSTEM?

The essence of the score-card system is the assigning of a number of points to as many conditions as possible, and the rating of each condition according to its deserts on the basis that the total number of points assigned to that condition represents perfection. The more detailed the card the nearer it is to the essential spirit or underlying philosophy of the system. It is like an appraisal of the stock of goods in a store or the property on a farm; the more carefully each item is valued and the less there is of lumping a number of items as miscellaneous or general conditions, the more accurate the result. A "score card" saying "general conditions 100" would be no score card at all. A score card as follows—

Equipment.....	40
Methods.....	60
Total.....	100

would be a score card only by a forced construction of words, because so little is itemized. A card like this—

Cows.....	25
Stable.....	25
Milk house and utensils....	25
Cooling milk, etc.....	25
Total.....	100

would be much better, yet would not get down to the vital score-card principle by reason of being too general and not being itemized as much as is possible.

The score card is not a set of peremptory orders, but a system of giving credit for good conditions and marking down for bad ones. It does not ask or expect a man to be perfect, but rates him as it finds his equipment and methods. A dairy in the seventies is usually in acceptable condition. The average of the scores of 35 certified dairies was 91.

#### FORM OF SCORE CARD.

The following is the latest edition of the score card (January, 1913) recommended by the Dairy Division and the Official Dairy Instructors' Association.

[Front of card.]

[United States Department of Agriculture, Bureau of Animal Industry, Dairy Division.]

#### SANITARY INSPECTION OF DAIRY FARMS.

##### SCORE CARD.

Indorsed by the Official Dairy Instructors' Association.

Owner or lessee of farm: ———. P. O. address: ———. State: ———.  
Total number of cows: ———. Number milking: ———. Gallons of milk produced daily: ———. Product is sold by producer in families, hotels, restaurants, stores, to ——— dealer. For milk supply of ———. Permit No. ———. Date of inspection, ———. Remarks: ———.

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(Signed) ———, *Inspector.*

[Back of card.]

Equipment.	Score.		Methods.	Score.	
	Perfect.	Allowed.		Perfect.	Allowed.
COWS.					
Health.....	6	.....	Clean.....	8	.....
Apparently in good health... 1			(Free from visible dirt, 6.)		
If tested with tuberculin			STABLES.		
within a year and no tu-			Cleanliness of stables.....	6	.....
berculosis is found, or if			Floor..... 2		
tested within six months			Walls..... 1		
and all reacting animals			Ceiling and ledges..... 1		
removed..... 5			Mangers and partitions... 1		
(If tested with in a year and			Windows..... 1		
reacting animals are			Stable air at milking time.....	5	.....
found and removed, 3.)			Freedom from dust..... 3		
Food (clean and wholesome)....	1	.....	Freedom from odors..... 2		
Water (clean and fresh).....	1	.....	Cleanliness of bedding.....	1	.....
STABLES.					
Location of stable.....	2	.....	Barnyard.....	2	.....
Well drained..... 1			Clean..... 1		
Free from contaminating			Well drained..... 1		
surroundings..... 1			Removal of manure daily to 50		
Construction of stable.....	4	.....	feet from stable.....	2	.....
Tight, sound floor and			MILK ROOM OR MILK HOUSE.		
proper gutter..... 2			Cleanliness of milk room.....	3	.....
Smooth, tight walls and ceil-			UTENSILS AND MILKING.		
ing..... 1			Care and cleanliness of utensils..	8	.....
Proper stall, tie, and manger.. 1			Thoroughly washed..... 2		
Provision for light: Four sq. ft. of			Sterilized in steam for 15		
glass per cow.....	4	.....	minutes..... 3		
(Three sq. ft., 3; 2 sq. ft., 2;			(Placed over steam jet, or		
1 sq. ft., 1. Deduct for un-			scalded with boiling		
even distribution.)			water, 2.)		
Bedding.....	1	.....	Protected from contamina-		
Ventilation.....	7	.....	tion..... 3		
Provision for fresh air, con-			Cleanliness of milking.....	9	.....
trollable flue system..... 3			Clean, dry hands..... 3		
(Windows hinged at bot-			Udders washed and wiped..... 6		
tom, 1.5; sliding win-			(Udders cleaned with moist		
dows, 1; other open-			cloth, 4; cleaned with dry		
ings, 0.5.)			cloth or brush at least 15		
Cubic feet of space per cow			minutes before milking,		
500 ft. ....			1.)		
(Less than 500 ft., 2; less			HANDLING THE MILK.		
than 400 ft., 1; less than			Cleanliness of attendants in		
300 ft., 0.)			milk room.....	2	.....
Provision for controlling			Milk removed immediately from		
temperature..... 1			stable without pouring from		
UTENSILS.					
Construction and condition of			pail.....	2	.....
utensils.....	1	.....	Cooled immediately after milk-		
Water for cleaning.....	1	.....	ing each cow.....	2	.....
(Clean, convenient, and abun-			Cooled below 50° F.....	5	.....
dant.)			(51° to 55°, 4; 56° to 60°, 2.)		
Small-top milking pail.....	5	.....	Stored below 50° F.....	3	.....
Milk cooler.....	1	.....	(51° to 55°, 2; 56° to 60°, 1.)		
Clean milking suits.....	1	.....	Transportation below 50° F.....	2	.....
MILK ROOM OR MILK HOUSE.					
Location: Free from contaminat-			(51° to 55°, 1.5; 56° to 60°, 1.)		
ing surroundings.....	1	.....	(If delivered twice a day, al-		
Construction of milk room.....	2	.....	low perfect score for storage		
Floor, walls, and ceiling..... 1			and transportation.)		
Light, ventilation, screens... 1					
Separate rooms for washing uten-					
sils and handling milk.....	1	.....			
Facilities for steam.....	1	.....			
(Hot water, 0.5.)					
Total.....	40	.....	Total.....	60	.....

Equipment ..... + Methods ..... = Final Score.

NOTE 1.—If any exceptionally filthy condition is found, particularly dirty utensils, the total score may be further limited.

NOTE 2.—If the water is exposed to dangerous contamination, or there is evidence of the presence of a dangerous disease in animals or attendants, the score shall be 0.

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## EXPLANATION OF CARD AND DIRECTIONS FOR USE.

The card has separate columns for "Equipment" and "Methods" and allows a total of 40 and 60 points, respectively, for each. This arrangement of points is made for the purpose of emphasizing the importance of good methods and giving unmistakable credit for cleanliness. A person may be handicapped by poor buildings which he has inherited or leased and which he can not afford to rebuild; but he can be clean. Painsstaking methods, particularly in regard to cleanliness, will give a creditable score in spite of poor equipment.

## EQUIPMENT.

*Health of cows.*—Every individual cow in a herd should be well nourished, sound, and healthy. Physical disability of any description, such as enlarged glands, lumpy jaw, running sores, inflamed or defective udder or teats, makes a perfect score impossible. A deduction should be made in the score in proportion to the number and importance of the defects found. In some instances the especially dangerous condition of a single cow, from the standpoint of healthful milk, may justify a score of zero for the entire herd.

The methods to be employed and the desirability of obtaining definite knowledge regarding the existence or nonexistence of tuberculosis are indicated on the score card. If the herd has been tested with tuberculin within the year and no tuberculosis found, or within six months and all reacting animals removed, the score will be perfect, and 5 points are allowed. If tested within the year, but not within six months, and reacting animals are found and removed, 3 points are allowed.

*Feed.*—Feed should be free from mustiness or offensive decomposition. Decaying silage, fermenting brewers' grains or distillery slops, or moldy or dusty hay should reduce the score. The improbability that the by-products of distilleries and breweries will be fed properly has led many authorities to condemn feeding distillery swill, and even wet brewers' grain. Under ordinary circumstances when these by-products are fed while moist the score for feed should be reduced to zero, and often a further reduction should be made under the item "stable air at milking time."

Sanitary inspection does not concern itself with balanced rations and the economical phases of dairying—only with clean, wholesome feed.

*Water.*—Drinking water for cows should be fresh and uncontaminated from any source. Danger of pollution from the drainage from barnyard, manure pile, or privy will reduce the score, as should unprotected wells and stagnant pools. Where the water tank, trough, or other receptacle is not kept clean, the score can not be perfect. The water supply should be so convenient to the stable as to make

it unnecessary to expose the cows to extreme cold or severe storms. The supply should be so abundant as to remove any doubt as to the ability of each animal to satisfy its thirst.

*Location and construction of stable.*—Cow stables should have a well-drained location. This does not relate to construction; a score should be reduced when the *site* is not drained, as when a barn is built in a depression or on level land which is not underdrained. The stables should also be free from contaminating surroundings. Horse stables, pigeons, chicken coops, stagnant water, privies, etc., when near enough to pollute the stable air or be breeding places for flies, should reduce the score. Provision is made in another place for a reduction of the rating when the barnyard is unclean and poorly drained, though when conditions are exceptionally bad an additional cut can be made here. A yard may be so very dirty as to be a contaminating adjunct of a stable.

The stable should have a tight, sound floor, incapable of absorbing liquids to any appreciable extent. An earth floor is undesirable. Back of the cows should be a gutter (preferably concrete) of sufficient capacity to hold the droppings and keep them from soiling the cows. A gutter 16 inches wide and 8 inches deep is recommended. It should have sufficient incline to drain readily, unless the liquid manure is taken up by absorbents. Some form of swing stanchion is the best kind of tie, as it allows freedom and keeps the animals out of the gutter. The manger should be as simple as possible; cumbersome constructions collect dust, prevent circulation of air, and are difficult to keep clean. When of wood the angles, joints, and cracks are especially liable to be dirty, and in case of outbreaks of tuberculosis disinfection is difficult. A concrete trough or a smooth floor answers the purpose as a manger and is given the highest score. Walls and ceilings should be smooth and tight; deductions in the score should be made for exposed crossbeams, bridging, braces, shelves, niches, ledges, and anything which might harbor dust.

*Provision for light.*—An abundance of light destroys bacteria, promotes the health of animals, and facilitates keeping things clean. In scoring for this item consider the number of stanchions rather than the number of cows which happen to be in the barn at the time of inspection. The score is for the means by which the light is obtained. A stable full of holes or with one side entirely removed would be scored zero for light because the light would be obtained at the expense of comfort of cows when protection is needed. The perfect means of lighting the stable, as of lighting the residence, is by glass windows, and a perfect score can be obtained only where there are 4 square feet of glass per stanchion. Sometimes a stable is well lighted on one side or at one end; in such case a deduction should be made from the score for "uneven distribution."

*Bedding.*—Cows should be bedded so as to promote their comfort, especially where the floor is of cement, but the bedding should not be of such nature as to contaminate the milk. Clean shavings are highly advantageous from the sanitary standpoint, though objectionable to some persons in the manure. Loam sand and dried muck are not to be commended, on account of the dust which is created from them and the great difficulty in keeping the dust out of the hair of the animals. Horse manure should not be used for bedding. Dusty or moldy hay or straw will not give a perfect score. The writer has found dairies of superior quality where the cows were bedded liberally with straw previous to milking, so much being used that the milkers had to kick it to one side in order to make a place to sit down and milk. Such a procedure would probably result in filling the air with bacteria-laden dust and militate against clean milk. The sufficiency of bedding in quantity is scored on the side of equipment; the cleanliness of the bedding and its proper use on the side of methods.

*Ventilation.*—The item of ventilation on the score card is subdivided into three topics. The first relates exclusively to the opportunity for providing pure air; the second to the prevention of excess of impure air from overcrowding of animals; the third to the efficiency of the method used for conserving animal heat as needed and for maintaining a proper temperature. The nearer any system of removing impure air and admitting fresh air approaches to being automatic the better it is. No system is absolutely automatic; but to be scored as perfect it should have some kind of controllable flues or their equivalent. The King system is the most generally known system of ventilation and is probably the best system when properly installed, in working order, and with sufficient capacity for the number of stanchions in the stable. Prof. King says: "There should be not less than 30 square inches per head when the outlet has a height of 30 feet above the ceiling of the stable." This duct should work on the principle of a chimney, and the higher it is the greater the draft or suction. Consequently as this outlet is of less height, the cross-section area should be greater; while if it is higher, the area may be less. A 20-foot outtake would require about 36 square inches per stanchion according to Prof. King.

The system of ventilation by windows swinging in at the top is an excellent one, though not quite equal to the King system, because the possibility of negligence is increased. A sliding window will receive a little credit, but less; while hay holes, large spaces in the loft, and even cracks in the boarding on the side might receive some slight consideration from the standpoint of admission of pure air.

A stable in which the cows have been kept overnight should be comfortable in the morning, without disagreeable animal odors.

The item relating to controlling stable temperature alludes to the adaptability of the means of providing fresh air to keeping the cows comfortable. For instance, a stable whose supply of pure air comes entirely through wide cracks in the boarding, admitting drafts on the cows, would score nothing on this item. Dependence upon sliding windows might also reduce the score, because they frequently admit air in drafts on the cows' backs. A stable having a roof of the monitor type would sometimes be uncomfortably cold under northern conditions by allowing too much heat from the cows' bodies to escape, and therefore such a roof would call for a reduction of the score, while the same condition in the South might be rated perfect.

An overcrowded barn produces discomfort, is hard to keep clean, and usually contains impure air. A proper amount of space per animal to receive a perfect score is considered to be not less than 500 cubic feet. In scoring for cubic feet of air space consider the number of stalls rather than the number of cows which happen to be present at the time of inspection. A stable having 50 stanchions with 15,000 cubic feet of space should be regarded as having 300 cubic feet per cow. An excessive amount of space for each animal dissipates the heat from the cows' bodies and may be as bad as overcrowding. Under northern conditions a reduction should be made in the score for "controlling the temperature" if the cubic space per cow exceeds 1,000 feet.

Prof. King, in his book on ventilation, frequently qualifies his statements by such clauses as "in cold climates." Through eastern North Carolina, South Carolina, Georgia, the Gulf States, two-thirds of Texas, southern New Mexico, southern Arizona, and the western slope of the Pacific coast, runs an isothermal line showing 10° F. below zero as the lowest temperature ever recorded during a period of about 38 years. This line somewhat generally marks an average mean temperature of about 40° F. for January, the coldest month. Below this line the temperature is higher. In most of the section below this line, however, occasional chilly winds and storms call for protection of animals, and therefore some means of ventilation, a fact which is too frequently overlooked by many milk producers in portions of the South and on the Pacific coast. The particular phase of ventilation which demands extreme conservation of animal heat is a negligible affair in this southern belt.

The stable should be scored for the way in which it appears to be adapted to secure results when those results are needed, and not merely on conditions at the time of the inspector's visit. For example, a stable without means of ventilation should be scored zero, even in summer when it is empty, the cows being in the pasture.



*Utensils.*—Utensils should be of tin, with as few seams as possible. Seams which are unavoidable should be flushed smooth with solder. Rusty and battered ware should not be used. Wire-gauze strainers should be avoided, also strainers which are complicated or have inaccessible parts that are hard to clean. Small-top milk pails should be used, as they keep out dirt and do much to promote clean milk. The water supply for washing utensils should be clean, abundant, and convenient; the chances are that cleansing will not be thorough when the water supply is meager or inconvenient. Impure water may convey undesirable bacteria to the utensils, which in turn will contaminate the milk; hence shallow wells receiving surface drainage are to be regarded with suspicion. No water from wells where seepage from house wastes or barnyard is possible should come in contact with milk utensils.

Milking should be done in clean suits used only for that purpose and stored in a clean place when not in use. A milk cooler should be found in every milk room, as well as facilities for an abundance of hot water or steam. Plenty of steam for sterilizing utensils is the perfect arrangement; but an abundance of hot water which can be used while it is at a boiling heat is a good substitute.

The word "cooler" means one of the various appliances for passing milk over a cool surface. A tank in the milk house is not a "cooler," but it is better than nothing and will be serviceable, especially when milk is sold by the can, and might be allowed a quarter point.

*Milk house.*—Every dairy should have a milk house or milk room fitted especially for the use to which it is to be put, in which milk can be strained, cooled, bottled, or canned, and stored, and in which utensils can be washed and cared for. If possible the washing of utensils and the handling of milk should be done in different rooms. The milk house, if attached to the barn, should have an independent outside entrance; if entered from the barn it should be through a well-ventilated passageway with self-closing doors at each end, only one of which can be open at a time. The milk house or room should not be near the hogpen, manure pile, privy, or anything that might contaminate the air or afford breeding places for flies. The milk room should be light, well ventilated, and screened. Flies should never have access to milk or utensils. The floor should be smooth and of concrete, sloping so as to give good drainage; the edge should be rounded to prevent angles for collecting and harboring dirt. The walls and ceiling should be smooth and tight; concrete or tile wainscoting is desirable. Dark corners or inaccessible places should be avoided. Where the milk house has several rooms the score should represent the average conditions, giving especial consideration to the room in which the milk is handled.

When there is a room in the stable where the milk is poured from the milk pails to a carrier can, that room should be considered a part of the milk house, for purposes of scoring.

#### METHODS.

*Cleanliness of cows.*—Cows are considered clean and entitled to perfect score when carefully groomed, and when the long hairs on the flanks and udders are clipped. Dust on backs reduces the score 1 point; large, easily visible particles of manure or mud on sides, tails, or udders another point, and long hairs on udders still another.

*Cleanliness of stable.*—Stable floors should be kept clean by frequent careful sweeping and washing. Walls should be free from manure. Joists, brackets, braces, tops of stanchions, partitions, ledges, and ceilings should be clean and free from dust and cobwebs. The inspector should carefully examine all of the places named for dust and make deductions when it is found. Mangers should be clean and sweet; there should be no dirt or fermenting feed in cracks and corners. Whitewash should be freely applied on walls, ceilings, partitions, etc. Windows should be clean. In scoring a "certified" or high-class dairy it is frequently necessary to make deductions of small fractions. The inspector should be extremely cautious about scoring any item absolutely perfect from the standpoint of cleanliness.

*Air in stable.*—The stable air should be free from dust and odors at time of milking. The air may be contaminated by lack of ventilation, by horses in the stable, by hogs in the basement, by manure in a cellar, by feeding silage or dusty fodder just before milking, by dusty bedding, by feeding distillery swill or wet brewers' grains, and in other ways. When inspectors can not be present at the time of milking, a reasonably accurate estimate of conditions can be reached by general appearances and by questioning the person in attendance as to time and manner of feeding, etc. When a dairy is scored several times a year, the inspector will soon get a just idea of conditions.

*Barnyard and manure.*—The manure should be removed daily from the stable, to such a distance (not in the yard) as to preclude the chance of odors or filth-laden flies getting back to the milk. There should be no accumulations of manure in the stable yard, which should be kept clean and reasonably dry in order to merit a perfect score. Where conditions are favorable the ideal way is to remove the manure daily to the field, and often this will prove an actual economy in conservation of plant food.

*Cleanliness of milk room.*—Where the milk house has several rooms the score for cleanliness must be based largely on the general conditions. Where there is a room in the barn where milk is poured

from the pail to the can that room should be regarded as a part of the milk house. But especial attention should be paid to the cleanliness of the room in which the milk is handled. This room should be used for no other purposes than cooling, canning, bottling, or storing milk; if it is used for general storage purposes or for anything but handling milk, the score should be materially reduced. A high standard of cleanliness should be maintained in every part of the floor, walls, and ceiling of the milk room. When milk is stored or cooled in a tank, bad odors or foul water will reduce the score. In some localities there is a growing tendency to introduce gasoline engines for power; and where these are located in the milk house, unless there is evidence of exceptional painstaking, the liability to odors is such that they should cause a reduction in the score.

*Cleaning utensils.*—All utensils should be clean on superficial inspection; no dirt should be found in seams or places difficult of access. After the utensils are washed they should be scalded with boiling water or steam to sterilize them. The highest score can be given only where an abundance of steam is freely used. Boiling water can be used so as to be as effective as steam, but the ordinary equipment for heating water does not provide it in sufficient quantities and of sufficient heat to sterilize the utensils.

The utensils after being washed and sterilized should be inverted in pure air to drain and dry. If allowed to remain upright, more or less dust may fall into them and flies may further contaminate them. Where a sterilizer is used a perfect score can be allowed if the utensils remain therein until used. At most dairies the utensils will be inverted on racks in the outdoor air.

*Milking.*—Methods of milking should be cleanly. The milker should milk with clean, dry hands. The cows' udders should also be clean; a perfect score is secured only by washing them thoroughly and then wiping dry. Wiping with a moist cloth is the next best thing, and wiping with a clean, dry cloth or brush gives one point on the score if done several minutes previous to milking, so that the dust can settle before the milking begins. If the milker after sitting down to milk gives the udder a rub with his hands or a dry cloth, he may stir up dust that will fall back into the milk pail; such a method is generally worse than doing nothing and should have no credit.

It would be desirable to have all scoring done at milking time, but this is impracticable, as it would limit the work of the inspector to two or three dairies a day. Careful questioning by the inspector, with close examinations, will usually give him a fairly accurate idea of the method of milking. If, for instance, he is told that the udders are carefully washed daily, while inspection shows lumps of manure attached to the long hairs near the teats, only one inference is pos-

sible. Sediment in the milk or dirt on a strainer cloth tells the story of a dirty udder.

*Handling milk.*—Milk as soon as drawn should be immediately removed from the stable so that it may absorb no odors or dust. If for convenience several milkers fill one can in the stable, a perfect score could not be given even if the can is promptly taken to the milk room when full, for it is bad practice to pour milk in the stable, and at least half a point should be deducted for that. The score should, however, be higher when, as stated above, each can is removed to the milk house as soon as filled than if the milk remained in the barn till all the cans were filled. When two or more cows are milked to fill a pail, which is then taken to the milk house, the score would not be quite perfect, but would be better than where the milk is poured in stable air.

As soon as the milk reaches the milk room it should be cooled. This is best performed by running it in a thin sheet over a surface kept cool by ice water. Spring water of a temperature under 60° F. has much merit for cooling milk, though it is not as good as ice. This process is sometimes carelessly called aerating, because aeration is an incident of cooling; but aerating as such is not in favor with the best authorities because of the great exposure of the milk to the air. Prompt and efficient cooling rather than aeration is desired, and the advantages of such cooling more than offset any possible injury from the extra exposure of the milk to the air. Where milk is sold by the can it is frequently cooled by setting the cans in tanks of water. This is better than no cooling, especially if ice water is used, and deserves some score for both promptness and efficiency; but it is not as satisfactory as running the milk over a cooler as soon as each cow is milked, which alone gets a perfect score. Sometimes the evening milk is properly cooled while the morning milk is delivered warm. This practice will give one half the score for cooling, provided the two kinds of milk are not mixed, in which case the score would be zero.

The cleanliness of the persons who do the work in the milk house is allowed 2 points on the score card.

*Storing.*—This refers to conditions where the night's milk is held over for delivery in the morning. When the producer goes to the trouble and expense of two deliveries a day, as in some southern latitudes where ice is not plentiful, that extra delivery can offset the absence of storing facilities and give a perfect score on this item, though from the standpoint of economy ice is often less expensive than the second delivery.

*Transportation.*—Transportation is to be scored from the same viewpoint as stables, to wit, the adaptability of the method to the

results desired when those results are needed. The word here means transportation as far as the producer is responsible—delivery to the railroad station, for instance. The transportation which is incident to distribution is not rated here.

#### ADVANTAGES OF THE SCORE-CARD SYSTEM.

Some of the advantages of the score-card system may be stated as follows:

1. A mathematical statement of conditions is more specific, accurate, and satisfactory than such words as "good," "excellent," "medium," "fair," "bad." These words mean little or much according to the ideals in the mind of the person using them.

2. The score-card system of inspection produces good results from the standpoint of the health officer, who represents the consuming public. It brings about great improvement in conditions. A minimum score can be established by ordinance, below which no dairy can be allowed to go if its product is to be sold in that city. At the same time the card stimulates those who are above the line to make further improvement.

3. The score-card system gains the good will of the producer and practically eliminates friction between him and the inspector, because everything is open and aboveboard. It gives no opportunity for favoritism. Any error or unfairness can be detected at once. Its openness is a protection to the producer against incompetent or dishonest inspectors. It further wins the regard of the producer, for it awakens an interest in him and helps the one who wants to improve his conditions, because its effect is educational. The producer is given a sort of photograph in figures of all his conditions; he sees just what he should do to get a higher score and to improve his work. It stimulates him to make improvements. We recommend leaving a duplicate of the scores with the dairymen.

4. This system helps the health officer to supervise the work of inspectors and greatly reduces the opportunity for shirking, faking, or errors.

5. This system helps the inspector by telling him just what to do, being a code of detailed instructions. It is the especial salvation of the inexperienced, incompetent inspector by placing before him an exact chart without which his work would be a failure. This does not mean that we advise the employment of such inspectors; but they are sometimes appointed, and when such a one is placed in office he should be helped as much as possible and the chances of his doing poor work reduced to a minimum. The ideal inspector knows so much about his business that he can not only make an accurate score, but he can give a reason for each item on the card and explain his figures; he can be a teacher as well as an inspector. When in-

struction and inspection go hand in hand the best results are secured. A city health department as such has directly nothing to do with the economics of milk production, but the inspector who has some knowledge of the subject and can drop a word of suggestion which will help the producer to greater profits is advancing his own cause by securing improvements in the dairies under his supervision without friction or opposition.

6. This system controls the faddist or the man who rides a hobby; he can give no more points for any one item than the score card allows.

7. The file of scores and tabulations becomes a valuable and useful system of records. It gives a permanent and accurate record of all the dairies in convenient form. It enables the health department to report to the public in exact figures what it is accomplishing. It tells physicians and consumers who are the best producers. It gives similar information to dealers who are looking for good dairies.

The cards recommended by the Dairy Division are 5 by 8 inches, which is one of the regular sizes of the various filing devices. In some cities the cards are filed alphabetically. In one city the cards are numbered consecutively and bound after being filled out. The numbers of the cards, the dates, and the scores are copied on smaller cards as below, which are filed alphabetically:

John Smith.		
Number.	Date.	Score.
1211	Jan., 1909	46
1329	July, 1909	50
1437	Dec., 1909	54

The latter system gives a dairyman's record at a glance, and also the work of any particular month.

8. The score-card system of inspection has a decided merit in connection with dairy laws and their enforcement, from its simplicity. Many codes are a complicated and elaborate collection of rules covering all that is essential in producing perfect milk, and therefore they can not be literally enforced. A simple regulation that all dairies must be six-tenths or seven-tenths perfect according to the Government score card is more simple, more easily enforced, more just, and less liable to abuse than any other system. The score-card system can be made elastic, allowing the health officer a moderate course at first with a low minimum score for passing; later on, with a higher score required, the system becomes more exacting.

Wherever the score card has been used it has been uniformly popular, and much space could be devoted to expressions from different

health officers and others who have used the card. The following are typical of the general opinion:

The score-card system of inspection is based upon common sense, and its advantages in the way of accuracy and fairness commend it to all who take the trouble to give it careful consideration. Until the appearance of the score card, little effort was made to classify the almost countless details which have to do with the purity and wholesomeness of milk. The many items requiring attention are now listed, and, still better, in the score card they are given numerical values which tend to show their relative values. When intelligently used, its value is appreciated alike by producers, consumers, and authorities. Its great advantage is that it is educational. It brings about improvement by showing the advantages of improvement rather than by resort to police power or threats. \* \* \* The score card shows the conditions at the dairy farm. It shows these in terms which a dairyman can understand. It uses the language of the dairyman.—(R. A. Pearson, Commissioner of Agriculture for the State of New York, at third conference of medical milk commissions.)

Fifty dairies gave an average score of 53.11 on the first inspection, which represents their condition at the beginning of the score-card system of inspecting dairies. The same dairies gave an average score of 59.59 on the second inspection, showing an improvement in equipment and methods of 12.15 per cent. In this number, which was selected as representing average conditions of the entire number of dairies sending milk to the city of Springfield, the lowest score was 38 on the first inspection and the same dairy received a score of 50.50 on the second inspection. The highest score on the first inspection was 74.33 and the same dairy scored 80 on the second inspection. The lowest dairy score on the second inspection was 50.50 and the highest 80. These figures illustrate the value of the score-card system of inspecting dairies, affording the department a definite knowledge of the efforts made by the producer in improving the sanitary conditions attending the production of market milk, and at the same time they point out the direction in which these improvements can be made.—(Annual report of the health department of Springfield, Mass., for 1909.)

I wish to call attention to the pedagogical value of the score card. It develops the student in his ideals of perfection, accuracy of observation, and his power of judgment. To formulate an ideal is absolutely essential so that the least variation at once attracts the attention. The score card directs attention to details often overlooked. It requires consideration of their meaning and significance. It sets up standards of precise observation in place of vague or sentimental impressions of things in general.—(Prof. John R. Commons, University of Wisconsin, in *Journal of Home Economics*, February, 1910, p. 28.)

The dairy score card has been found a most useful means for simplifying the work of the dairy inspection. All of the essential facts of importance regarding equipment and methods are tabulated in an orderly manner, and numerical weight is assigned to each point in proportion to its importance. The inspector takes up each point in detail and enters on the score card a number expressing his opinion of the relation that the condition in question bears to the standard of perfection. The total score represents his very carefully analyzed opinion of the condition of the dairy as compared with the standard of perfection followed.

The score card has many advantages. The tendency to neglect details in the inspection is checked, for the inspector has before him comprehensive suggestions. If he is inexperienced, any tendency to overestimate or underestimate the importance of the various details is obviated. In making recommendations

regarding certain details his advice is made more weighty by the score card, to which he may refer the dairyman. A copy of the score, left with the dairyman, is a permanent record of the criticisms, as is likewise the copy kept by the inspector. By comparison of the scores made at different times the progress of improvement may be measured. Inspection with scoring can most readily bring about the proper equipment, such as cooling and scalding apparatus, etc.—(From "Pure Milk and the Public Health," by A. R. Ward, assistant professor of bacteriology and director of the State hygienic laboratory, University of California, Berkeley, Cal., 1909.)

No serious disadvantages in the score-card system have been reported, though it has been used by many inspectors under diverse conditions. One inspector writes that this system takes more time than any other, which after all is a commendation rather than a criticism, indicating greater thoroughness. The "personal equation" has been named as an objection by one health officer, but this is an objection in any system, and a minutely subdivided score card has the advantage of reducing the personal equation to the minimum. Many striking proofs of this have been furnished where different inspectors working independently of each other have agreed within a fraction of a point in scoring the same dairy.

As to matters of detail occasional suggestions are made, many of them good ones. And sometimes a health officer or inspector attempts to prepare an "improved" score card; but the Dairy Division card now represents the result of more experience and the consensus of more dairy authority than any one person can command. Furthermore, uniformity in the system is desirable, and a standard national form is better than a different one for every city. But to secure this, individual preferences must sometimes be waived. Experience with the card shows that it is, on the whole, well adapted to a great majority of, if not all, places in the country.

#### SOME RESULTS.

There is abundant proof that the score-card system brings immediate and permanent results wherever it is put into practice. The following quotations and records, selected from a mass of evidence, illustrate the possibilities of improvement within a short period.

The average score of the dairies supplying Richmond, Va., with milk was 41.5 when the work of inspection was commenced there in May, 1907; 13.8 per cent were in the twenties, 30.8 per cent in the forties, and 26.2 per cent were in the fifties. By February, 1908, there was no score below 60, and the average was 69.6. In April, 1910, only 4 per cent were below 70, and the average was 80.4.

At Montclair, N. J., the use of the score card reduced the average bacterial content of milk from 91,000 in 1907 to 53,000 in 1909.

Figures showing improvement at Springfield, Mass., are given on page 22 in the extract from the annual report of the health department.



The following table shows the improvement made in six places, selected from different sections of the country and representing cities of a wide range of population, as reported by the local officials who made the scores:

Cities.	Average scores.		Average points gained.	Per cent of gain.
	1909	1910		
Los Angeles, Cal. ....	55	63	8	15
Glens Falls, N. Y. ....	49	62	13	27
Concord, N. H. ....	40	46	6	15
Hudson, N. Y. ....	40	50	10	25
Clinton, Iowa. ....	56	67	21	36
Portland, Oreg. ....	36	45	10	28

This is an average gain of 24 per cent for the places named. The gain is always most rapid and most noticeable when the work is new, as in the above places, and when very poor conditions are being improved. In Richmond, Va., where great gains were made in the early years of the work, as previously stated, the advance for the year 1909 was from 76 to 79, an average of only 3 points, or 4 per cent.

#### PUBLICITY OF SCORES.

Publicity of scores is a stimulus to any dairyman, a valuable advertisement to the progressive producer, and often a great assistance to the consumer. Publication of scores encourages the better dairymen to continue to improve and calls public attention to the careless and slovenly. The latter by loss of customers or by act of the authorities should be forced out of business. They ought not to sell milk in competition with their neighbors who score high. Consumers who take an interest in their milk supply will note the standing of the different dairies and patronize the dairymen who have good ratings. The quality of the milk supply of any city depends in a large measure on the consumer, and he can do much to encourage the production of good milk.

Many cities issue weekly or monthly health bulletins, and in some of these the ratings of the various dairies are published from time to time. For example, the health department of Norfolk, Va., publishes in the monthly bulletin a statement giving the names of dairy-men and dairies and the total score of each, arranged in numerical order, with the highest score at the head of the list. In several cities the scores are published in newspapers.

#### ADAPTABILITY OF THE SYSTEM.

Dairy conditions in different sections of the country are somewhat varied, particularly in respect to climate. For example, in the Northern States the temperature frequently drops to several degrees

below zero during the winter, and cattle must be housed for five or six months. This necessitates tight barns and a good system of ventilation, together with a reasonable amount of air space, if the animals are to be kept comfortable and healthy. On the other hand, there are sections in the South and on the Pacific coast where the stables are simply open sheds. In such sheds sunlight, ventilation, and air space are unlimited, and it would seem as if these points hardly need to be included in a score card for those sections. Hence modifications of the department score card have seemed necessary to meet different conditions. But increasing experience in all parts of the country convinces us that the need of these modifications is less than at a first glance would appear. It is one of the fundamental principles of both sanitary and economical dairying that cows shall be comfortable at all times and in all sections. Even in localities where the average temperature is comparatively mild there are occasional cold storms and piercing winds. Hence after all there are but few places where it is not desirable to provide shelter and protection for the cows, even if only for a few days at a time, and with this should go proper means for light and ventilation. This is recognized in the new barns built in the milder latitudes. Therefore a perfect score, which means perfect conditions, calls for substantially the same standard of measurement in all places, even though shelter may, as a matter of degree, be necessary a greater number of days in one section than in another. And yet a little more elasticity may possibly be allowed for ventilation in one place than in another.

The scoring of dairy farms has proved so effective and popular that the principle has been extended to other phases of dairy inspection. The Dairy Division has devised and used for several years score cards for rating the establishments and methods of city milk dealers, the distributive part of the business when one man is both producer and retailer, the milk itself (used only in competitive exhibitions), butter factories, and renovated butter factories. Dr. William C. Woodward, health officer of the District of Columbia, has devised a score card for the health and cleanliness of the cows, and Dr. W. A. Evans, former health commissioner of Chicago, Ill., devised a score card for "bottling plants." Other health officers have devised a scale of points for rating grocery stores and markets.

#### INSPECTION OF CITY MILK PLANTS.

As cities grow, the producers can not personally deliver milk to all the consumers, consequently middlemen become a necessity. These middlemen have places of business which are designated by different names in different places, but in these pages they are referred to as "city milk plants." These city milk plants have a wide range of capacity, equipment, and methods. At one extreme is

a building 300 to 400 feet long on a spur of a railroad, where milk is received by the trainload, cooled, mixed, filtered, perhaps pasteurized, canned or bottled, and held in cold storage until retailed in the city. The building has ample modern machinery for all these processes, and for washing and sterilizing cans and bottles for laboratories, salesrooms, and business offices. At the other extreme is the dealer retailing only a few gallons. His "plant" may consist of only a carrier can and a quart measure, which are washed in the kitchen sink with the family dishes. Or he may have fitted up the dark, ill ventilated basement of his residence as a "milk plant," with a musty wooden tank for cooling milk, a few dozen bottles, a washtub in which to cleanse them, a dipper for filling bottles, and a brush to agitate lukewarm water inside the bottles. It does not necessarily follow that all small dealers adopt improper practices, but the chances are that the ordinary man with small capital and with only a little at stake will not take as much care as a person differently situated.

All of the varying styles of city milk plants need careful inspection, but the principles governing the business of the middlemen are the same as those governing the producer. Milk should be exposed to the air as little as possible, and the air should be pure; milk should not be handled in unclean utensils, and it should always be kept cool. Consequently in city plants as in dairy inspection the same general principles must govern the inspector. Based on these principles a score card for city milk plants has been devised by the Dairy Division and amended from time to time. It has been found in practice to be adapted to small and large plants. It is as follows:

[Cir. 199]

[United States Department of Agriculture, Bureau of Animal Industry, Dairy Division.]

## SANITARY INSPECTION OF CITY MILK PLANTS.

## SCORE CARD.

Owner or manager: \_\_\_\_\_. Street and No.: \_\_\_\_\_. City: \_\_\_\_\_. State: \_\_\_\_\_.  
 Trade name: \_\_\_\_\_. Number of wagons: \_\_\_\_\_. Gallons sold daily—Milk: \_\_\_\_\_.  
 Cream: \_\_\_\_\_. Permit or License No.: \_\_\_\_\_. Date of Inspection: \_\_\_\_\_, 191...  
 Remarks: \_\_\_\_\_.

Equipment.	Score.		Methods.	Score.	
	Per- fect.	Al- lowed.		Per- fect.	Al- lowed.
<b>Building:</b>			<b>Building</b> .....	14	.....
Location: Free from contaminat- ing surroundings.....	2	.....	Cleanliness:		
<b>Arrangement</b> .....	7	.....	Floors.....	3	.....
Separate receiving room.....	1	.....	Walls.....	2	.....
Separate handling room.....	2	.....	Ceilings.....	2	.....
Separate wash room.....	1	.....	Doors and windows.....	1	.....
Separate salesroom.....	1	.....	Shafting, pulleys, pipes, etc.....	1	.....
Separate boiler room.....	1	.....	Freedom from odors.....	2	.....
Separate refrigerator room.....	1	.....	Freedom from flies.....	3	.....
<b>Construction</b> .....	12	.....	<b>Apparatus</b> .....	7	.....
Floors tight, sound, cleanable.....	2	.....	Cleanliness:		
Wall tight, smooth, cleanable.....	1	.....	Thoroughly washed and rinsed.....	3	.....
Ceiling smooth, tight, clean- able.....	1	.....	Milk-handling machin- ery.....	2	.....
<b>Drainage</b> .....	2	.....	Pipes, cans, etc.....	1	.....
Floors.....	1	.....	Sterilized with live steam.....	3	.....
Sewer or septic tank.....	1	.....	Milk-handling machin- ery.....	2	.....
Provision for light.....	2	.....	Pipes, cans, etc.....	1	.....
(10 per cent of floor space.)			Protected from contamina- tion.....	1	.....
Provision for pure air.....	2	.....	<b>Bottles</b> .....	7	.....
Screens.....	1	.....	Thoroughly washed and rinsed.....	3	.....
Minimum of shafting, pulleys, hangers, exposed pipes, etc.....	1	.....	Sterilized with steam 15 min- utes.....	3	.....
<b>Apparatus</b> .....	15	.....	Inverted in clean place.....	1	.....
Boiler.....	2	.....	<b>Handling milk</b> .....	22	.....
(Water heater, 1.)			Received below 50° F.....	3	.....
Appliances for cleansing utensils and bottles.....	2	.....	(50° to 55° 2; 55° to 60°, 1.)		
Sterilizers for bottles, etc.....	2	.....	Rapidity of handling.....	2	.....
Bottling machine.....	1	.....	Freedom from undue exposure to air.....	2	.....
Capping machine.....	1	.....	Cooling.....	5	.....
Wash bowl, soap, and towel in handling room.....	1	.....	Promptness.....	2	.....
<b>Condition</b> .....	6	.....	Below 45° F.....	3	.....
Milk-handling machinery.....	3	.....	(45° to 50°, 1.)		
Pipes, couplings, and pumps.....	2	.....	Capping bottles by machine.....	2	.....
Cans.....	1	.....	Bottle top protected by cover.....	1	.....
<b>Laboratory and equipment</b> .....	2	.....	<b>Storage</b> .....	4	.....
<b>Water supply</b> .....	2	.....	(45° to 50° 3; 50° to 55°, 1.)		
Clean and fresh.....	1	.....	Protection during delivery.....	2	.....
Convenient and abundant.....	1	.....	(Iced in summer.)		
			Bottle caps sterilized.....	1	.....
			<b>Inspection</b> .....	6	.....
			Bacteriological work.....	3	.....
			Inspection of dairies supplying milk.....	3	.....
			(2 times a year, 2; once a year, 1.)		
			<b>Miscellaneous</b> .....	4	.....
			Cleanliness of attendants.....	2	.....
			Personal cleanliness.....	1	.....
			Clean, washable clothing.....	1	.....
			Cleanliness of delivery outfit.....	2	.....
<b>Total</b> .....	40	.....	<b>Total</b> .....	60	.....

Score for equipment..... + Score for Methods..... = ..... Total Score.

NOTE.—If the conditions in any particular are so exceptionally bad as to be inadequately expressed by a score of "0" the inspector can make a deduction from the total score.

\_\_\_\_\_, Inspector.

What has been said elsewhere of the advantages of the score card in dairy farm inspection will apply here with equal force. The merits of the system are the same on the farm as in the city milk plant, but frequently the scores of the latter are higher than the former. The average score of the District of Columbia milk plants in 1907 was 72 on the basis of 100 points for perfect. This was considerably above the average for the dairy farms supplying milk to the District, which was 45. The city milk plants must conform to building and plumbing regulations; they are more easily reached by the inspector than the remote dairy farms, and are therefore under constant pressure to be in good condition; they have the city water supply, which is presumed to be satisfactory for cleaning utensils; they are also required to be reasonably clean, otherwise they will create a nuisance by reason of bad odors and flies. In many cities the producers retail their own product until the growth of the place leads some person or corporation with a fair amount of capital to erect a building planned especially for the business. Under such conditions the city plant has modern and effective machinery, is maintained in a sanitary condition, has provision for ample refrigeration, and has plenty of steam for cleansing and sterilizing utensils and bottles.

With what has been said heretofore detailed instructions for scoring milk plants seem unnecessary, but attention is called to some points. The surroundings of the plant are important. Note should be made of the more apparent objectionable features, such as the proximity of horse stables or too close connection with sleeping rooms or rooms used for domestic purposes. It should also be remembered that even a detached building in a residential district, especially a tenement district, may have its dangers. For instance, windows may be located so as to catch the dust from rugs as they are shaken from the windows of an adjoining tenement. In the smaller plants all of the processes may be carried on in one room, but different rooms for handling milk and washing bottles are desirable. When a plant has several rooms the scoring will be more difficult, but the inspector must use judgment in approximating a reasonable average.

#### CONCLUSION.

Present conditions indicate that a rigid inspection of the production and handling of milk will continue and that more inspectors should be employed, the exact number being dependent on the willingness of city councils to appropriate money therefor. The inspectors should be well trained in dairy sanitation and in the production and distribution of milk, and should be capable of instructing the dairyman in all details of his work as well as of merely scoring his dairy. In order to do the most effective dairy inspection under the

score-card system some inspectors should, in the larger cities at least, devote their entire time to looking after conditions on the farms. One man under average conditions, making allowances for holidays, vacations, stormy weather, bad roads, and writing reports and records, will score from six to eight dairies a day. The lower figure for 300 days would give 1,800 inspections a year. If inspections are made monthly, one inspector would be required for 150 dairies; if made quarterly, one for 450. Where the city is large enough to employ several inspectors, it would be well to have one-half the force skilled veterinarians. Where the size of the place will warrant, a chief inspector is advisable. In smaller cities it is sometimes necessary for one man to inspect dairies, make sanitary inspections in the city, take samples for evidence of adulteration, and possibly do his own chemical and bacteriological work. Even under these circumstances an inspector who is interested in his work can be trusted to inspect the farms with the score card, for he will be more or less familiar with the milk problems as a whole. Wherever feasible, milk work should be a distinct branch of the health department and not combined with slaughterhouse inspection, tenement inspection, etc. It is usually desirable to have both city and country inspection under one head. In cities of all sizes the taxpayers must realize that the money necessary for a thorough system of inspection will be a good investment.

It is unfortunate that health officers and dairy inspectors are constantly changing, for no reason connected with the good of the service, but merely for political causes. This cripples or destroys systematic work and retards improvement. Officers of health departments should be appointed under civil-service regulations and have a reasonably secure tenure of office. The health of the community is of more importance than temporary political advantage of any party or faction.

The health of employees is an important consideration and should receive the careful attention of inspectors. This is not given space on the score card for the reason that where unhealthy persons are handling milk that dairy should be refused a score and compelled by the health officials to discontinue business until the cases of disease are isolated and properly quarantined if contagious.

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- Illinois Bulletin 9. Milk and Butter Tests; Milk Tests.
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- Illinois Bulletin 14. Milk Tests; Methods of Testing Milk.
- Iowa Bulletin 8. The Iowa Station Milk Test.
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- New Hampshire Bulletin 114. The Babcock Test for New Hampshire Farmers.
- New York (Cornell) Bulletin 17. A Description of Cochran's Method for the Determination of Fat in Milk, for Use of Dairymen.
- New York (Cornell) Bulletin 29. Application of Dr. Babcock's Centrifugal Method to the Analysis of Milk, Skim Milk, Buttermilk, and Butter.
- New York (Geneva) Bulletin 19 (new series). A Method for the Determination of Fat in Milk and Cream.
- North Carolina Bulletin 113. The Testing of Milk.
- Oregon Bulletin 70. Testing Milk and Cream.
- Pennsylvania Bulletin 12. Simple Methods of Determining Fat in Milk.
- Pennsylvania Bulletin 33. Directions for Using the Babcock Milk Test.
- Vermont Bulletin 16. Testing Milk at Creameries.
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- Wisconsin Bulletin 31. Notes on the Use of the Babcock Test and the Lactometer.

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- Bureau of Animal Industry Bulletin 58. The Fat Testing of Cream by the Babcock Method. Price 5 cents.
- Bureau of Chemistry Bulletin 100. Some Forms of Food Adulteration and Simple Methods for Their Detection. Price 10 cents.
- Bureau of Chemistry Bulletin 107. Official and Provincial Methods of Analysis, Association of Official Agricultural Chemists. Price 20 cents.

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<sup>1</sup> These publications may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C.

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